ciated with motion on the Darby and Prospect-Jackson thrust, and because of the uplift of the Tetons. The style of thrusting in this system then should be typical of the regional Absaroka thrust sheet.

WORK, DAVID F., Amoco Production Co., Denver, CO

Whitney Canyon—A Proved Giant—Only Small Part of Rocky Mountain Overthrust Belt

The Overthrust belt of the Rocky Mountain region has been the subject of extensive exploration activity since American Quasar's discovery of oil at Pineview field in 1975. The recognition of the significant potential in previously unexplored or lightly explored parts of the thrust belt has caused more than 175 wildcats to be drilled since the discovery of Pineview field. Eleven additional fields have been discovered and 100 development wells have been drilled.

Whitney Canyon/Carter Creek field is by far the largest discovery to date with reserves exceeding 3.1 Tcf of gas and 66 MM bbl of oil. At least seven pay zones have been confirmed and a 4,500 ft (1,372 m) of gas column identified. Combined flow rates exceed 75 MMcf of gas per day at Amoco Production's 457-A well.

The potential for additional discoveries is very high. With 10 or more reservoirs and several types of structural traps productive, the success ratio should remain above average as exploration spreads out from southern Wyoming and northern Utah. During 1979 the industry will drill at least three wells north and three wells south of the currently productive area. Amoco considers these prospects to have very high potential.

A major obstacle to rapidly achieving the Overthrust belt's full production potential is the time needed to design, permit, and build the necessary natural gas processing plants.

WORK, PHILLIP L., Tetra Tech, Inc., Houston, TX

NPR-Alaska, an Update

One of America's last, large frontier onshore hydrocarbon exploration provinces, the vast National Petroleum Reserve in northern Alaska, continues to offer considerable hydrocarbon potential. Although commercial discoveries of oil and natural gas have yet to be found, many significant prospects remain. Several structural features have been tested, but the most promising future prospects appear to be stratigraphic.

The federal government, first through the U.S. Navy and now under the U.S. Geological Survey, has amassed a very competent, dedicated staff and a tremendous amount of excellent exploration data. The data are currently being integrated into many private industry exploration programs and files through the public release of hundreds of millións of dollars' worth of new geophysical and geologic data. Both government and private industry must continue to maintain a very positive exploration "attitude" toward this important area. WUENSCHEL, P. C., Gulf Research and Development Co., Pittsburgh, PA

Sonic Logs From Explorationist's Viewpoint

The sonic log is fundamental to the reflection seismologist because it represents the relation between the seismic reflection response recorded at the earth's surface and subsurface stratigraphy. Explorationists should be familiar with the development of sonic-logging tools and the accuracy with which the interval velocity can be obtained from each generation of tool development. Current tools, such as the long-spacing sonic log and the digitized sonic wave-form log, hold great promise in providing the quality of interval velocity data explorationists have long desired.

- YÜKLER, A. M., and D. H. WELTE Inst. Oil and Organic Geochemistry, Kernforschungsanlage Jülich, Jülich, German Federal Republic
- Three-Dimensional Simulation of Geologic, Hydrodynamic, and Thermodynamic Development of a Sedimentary Basin—New Approach

An understanding of paleopressures and paleotemperatures can guide and limit the application of geologic, geochemical, hydrodynamic, and thermodynamic principles in our study of the evolution of a sedimentary basin. Although we have qualitative understanding of the influence of paleopressure and paleotemperature on the interaction of sedimentation, compaction, and subsidence, a quantitative evaluation of the system is needed to understand basin history.

Accordingly, a three-dimensional, deterministic dynamic model was constructed to quantify mass and energy transport in sedimentary sequences of a basin. A new water flow equation was derived for a compacting porous medium under moving boundary conditions, and was coupled with the heat flow equation for the transfer of heat by conduction and forced convection (due to water movement). By varying heat flux, initial physical and thermal properties of sediments, paleobathymetric estimates and sedimentation rate, this model can compute pressure, temperature, and physical and thermal properties as a function of space and time.

Studies with this model show that pressure and temperature are closely interrelated with the geologic developent of a basin. Changes in heat flux alter relations between pressure and physical and thermal properties, and depth. For example, all the dependent and independent variables being equal, a change in heat flux affects the thickness of sediments in such a way that a 1,300-m thick clay layer subjected to a geothermal gradient of 40° C/km will compact to 1,236 m for an increase of 5° C/km, but will expand to 1,400 m with a decrease of 5° C/km to 35° C/km. Consequently, plots of pressure and physical and thermal data against depth are altered.

This dynamic model was successfully used to study a real basin. Pressures and physical and thermal data were computed with an error of less than 8%, and temperatures with an error of approximately 2°C, with respect to all other data.